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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

| Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 2: Applied Research</i> | | | | | R-1 Program Element (Number/Name) PE 0602622A / <i>Chemical, Smoke and Equipment Defeating Tech</i> | | | | | | | |
|--|--------------------|----------------|----------------|---------------------|---|----------------------|----------------|----------------|----------------|----------------|-------------------------|-------------------|
| COST (\$ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
| Total Program Element | - | 3.772 | 4.004 | 5.032 | - | 5.032 | 5.612 | 4.195 | 4.281 | 4.367 | 0.000 | 31.263 |
| 552: <i>Smoke/Novel Effect Mun</i> | - | 3.772 | 4.004 | 5.032 | - | 5.032 | 5.612 | 4.195 | 4.281 | 4.367 | 0.000 | 31.263 |

A. Mission Description and Budget Item Justification

This Program Element (PE) investigates and evaluates obscurant technologies to increase personnel and platform survivability and develop and validate forensic analysis methods for military and homemade explosive devices, including their precursors and residue. Project 552 pursues research in materials science as well as dissemination methodologies, mechanisms, technologies, and techniques to enable forensic analysis of explosive signatures.

Work in this PE is related to, and fully coordinated with, PE 0603004A, Project L97 (Smoke and Obscurants Advanced Technology) and PE 0603606A, Project 608 (Countermines & Barrier Development).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

This work is performed by the Army Research, Development, and Engineering Command (RDECOM)

| B. Program Change Summary (\$ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| Previous President's Budget | 3.923 | 4.004 | 5.032 | - | 5.032 |
| Current President's Budget | 3.772 | 4.004 | 5.032 | - | 5.032 |
| Total Adjustments | -0.151 | 0.000 | 0.000 | - | 0.000 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.149 | - | | | |
| • FFRDC | -0.002 | - | - | - | - |

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| Exhibit R-2A, RDT&E Project Justification: PB 2019 Army | | | | | | | | | | Date: February 2018 | | |
| Appropriation/Budget Activity 2040 / 2 | | | | | R-1 Program Element (Number/Name) PE 0602622A / Chemical, Smoke and Equipment Defeating Tech | | | | Project (Number/Name) 552 / Smoke/Novel Effect Mun | | | |
| COST (\$ in Millions) | Prior Years | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total | FY 2020 | FY 2021 | FY 2022 | FY 2023 | Cost To Complete | Total Cost |
| 552: Smoke/Novel Effect Mun | - | 3.772 | 4.004 | 5.032 | - | 5.032 | 5.612 | 4.195 | 4.281 | 4.367 | 0.000 | 31.263 |

A. Mission Description and Budget Item Justification

This Project investigates and evaluates obscurant technologies that degrade threat force surveillance sensors and defeat the enemy's target acquisition devices, missile guidance, and directed energy weapons. This Project focuses on advanced infra-red (IR) and multi-spectral obscurant materials that provide effective, affordable, and efficient screening of deployed forces, while being safe and environmentally acceptable. Additionally, it researches and investigates forensic analysis technology in explosives and explosives-related chemical signatures, and develops and validates field sampling and forensics methods for use in a forward-deployed laboratory.

This Project sustains Army science and technology efforts supporting the Ground Maneuver Portfolio.

Work in this Project is related to, and fully coordinated with, PE 0603004A. Project L97 (Smoke and Obscurants Advanced Technology) and PE 0603606A, Project 608 (Countermines & Barrier Development).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

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|---|----------------|----------------|----------------|
| B. Accomplishments/Planned Programs (\$ in Millions) | FY 2017 | FY 2018 | FY 2019 |
| Title: Advanced Obscurants | 1.468 | 1.518 | 1.563 |
| Description: This effort investigates new materials and compounds to enable safe, effective screening of personnel and equipment. | | | |
| FY 2018 Plans: Measure screening performance of top candidate bispectral materials. Design and build a chamber to measure microwave obscurant performance. | | | |
| FY 2019 Plans: Will continue to mature and characterize advanced bispectral, will advanced microwave and spectrally selective obscurants. | | | |
| FY 2018 to FY 2019 Increase/Decrease Statement: Increased funding needed to achieve Smoke as a Soft kill measure in APS | | | |
| Title: Obscurant Enabling Technology | 1.000 | 1.002 | 2.000 |
| Description: This effort investigates distribution technologies for various obscurants. This effort will support Modular Active Protection System (MAPS) in 0602601/C05 and 0603005/221. | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2019 Army | | Date: February 2018 | |
| Appropriation/Budget Activity 2040 / 2 | R-1 Program Element (Number/Name) PE 0602622A / Chemical, Smoke and Equipment Defeating Tech | Project (Number/Name) 552 / Smoke/Novel Effect Mun | |
| B. Accomplishments/Planned Programs (\$ in Millions) | | FY 2017 | FY 2018 |
| <p>FY 2018 Plans: Evaluate performance of pneumatic dissemination against the performance of other distribution technologies. Continue to conduct vulnerability studies of various technologies to obscurant/target defeat effects.</p> <p>FY 2019 Plans: Will document vulnerability studies analyses. Will develop new vehicle protection concepts based on vulnerability studies of anti-tank guided missiles. Will continue to conduct vulnerability studies of various technologies to obscurant/target defeat effects.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Maturing program costs for experimentation hardware</p> | | | |
| <p>Title: Forensic Analysis of Explosives</p> <p>Description: This effort investigates forensics analytical methods for military explosives, homemade explosives (HME), HME precursors, and residue analysis for attribution.</p> <p>FY 2018 Plans: Investigate integrated photonics chips as a proof of concept device for the detection of explosives, drugs, and other molecules of interest for forensic analysis and wearable detectors; investigate a proof of concept device for the sensing explosives and precursor chemicals based on impedance using novel dielectric materials.</p> <p>FY 2019 Plans: Will investigate Photonic Integrated Circuits (PIC) for chemical sensing of explosives, narcotics, and other chemicals of interest for forensic analysis and personnel borne detectors. Will investigate metal organic framework polymer composites to enhance selectivity in explosives detection.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Slight reduction to support obscurant enabling technology</p> | | 1.304 | 1.484 |
| Accomplishments/Planned Programs Subtotals | | 3.772 | 5.032 |
| C. Other Program Funding Summary (\$ in Millions) | | | |
| N/A | | | |
| Remarks | | | |
| D. Acquisition Strategy | | | |
| N/A | | | |

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| E. Performance Metrics N/A | | |